Wildfire CQ2

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Overarching Science Question

How are fires and vegetation composition coupled?

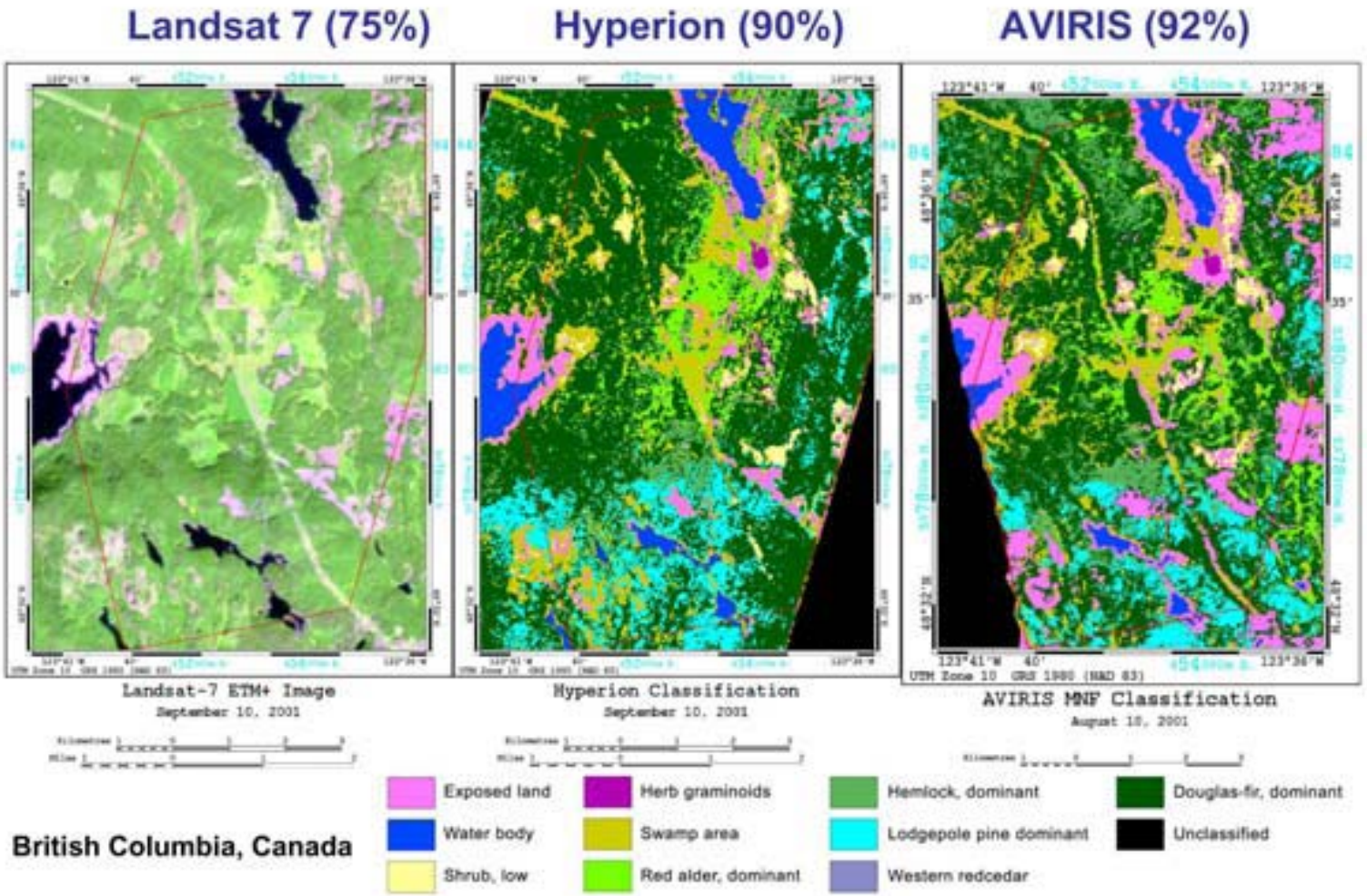
Science Subquestions

- How does the timing, temperature and frequency of fires affect long-term ecosystem health?
- How does vegetation composition and fire temperature impact trace gas emissions?
- How do fires in coastal biomes affect terrestrial biogeochemical fluxes into estuarine and coastal waters and what is the subsequent biological response? *[DS 198]*
- What are the feedbacks between fire temperature and frequency and vegetation composition and recovery?
- How does vegetation composition influence wildfire severity?
- How does invasive vegetation cope with fire in comparison to native species?
- On a watershed scale, what is the relationship of vegetation cover, clay-rich soils and slope, to frequency of post-fire debris flows?

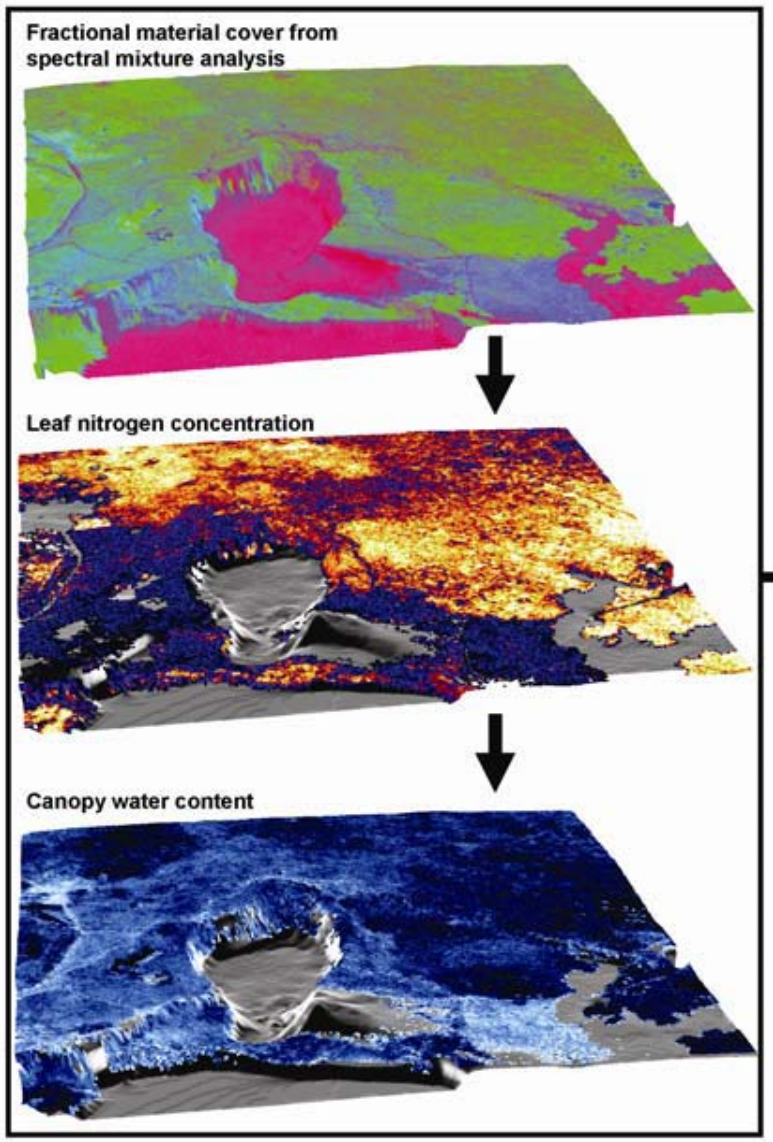
Benefits of HyspIRI VSWIR

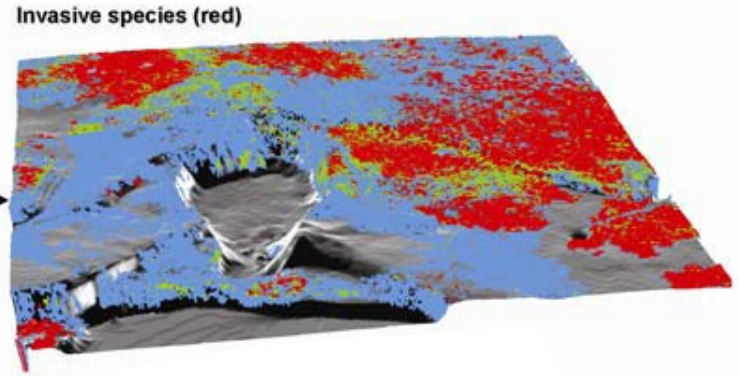
- Enables detailed look at coupling between vegetation and fire
  - Improved vegetation mapping
- Improved fire emissions estimates
  - Fuel composition, fuel moisture, biomass, fire state (flaming vs. smoldering)
- Improved fire susceptibility mapping
  - Fuel composition, fuel moisture, vegetation stress

Improved Vegetation Mapping



Source: Goudenough et al. (2003)

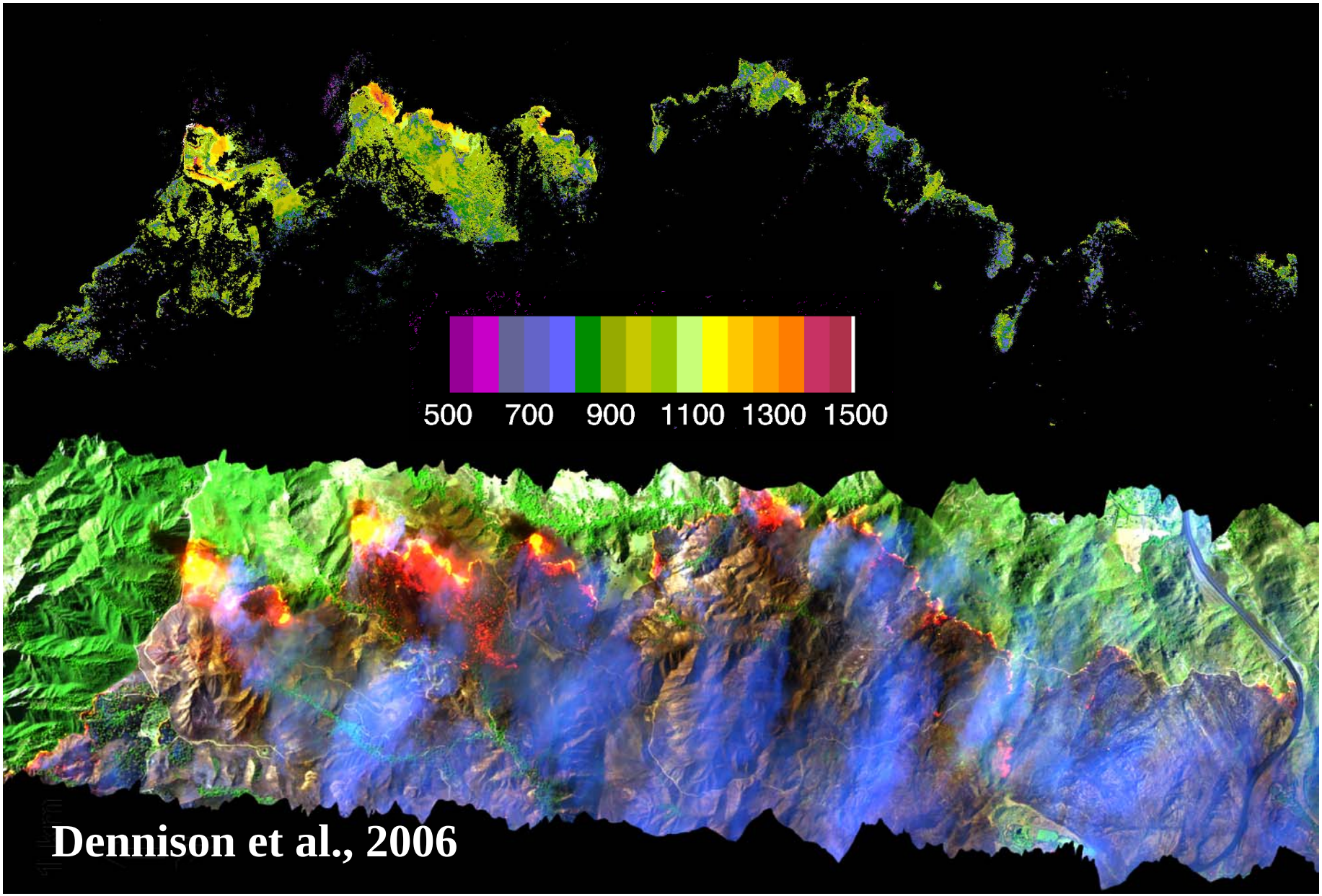




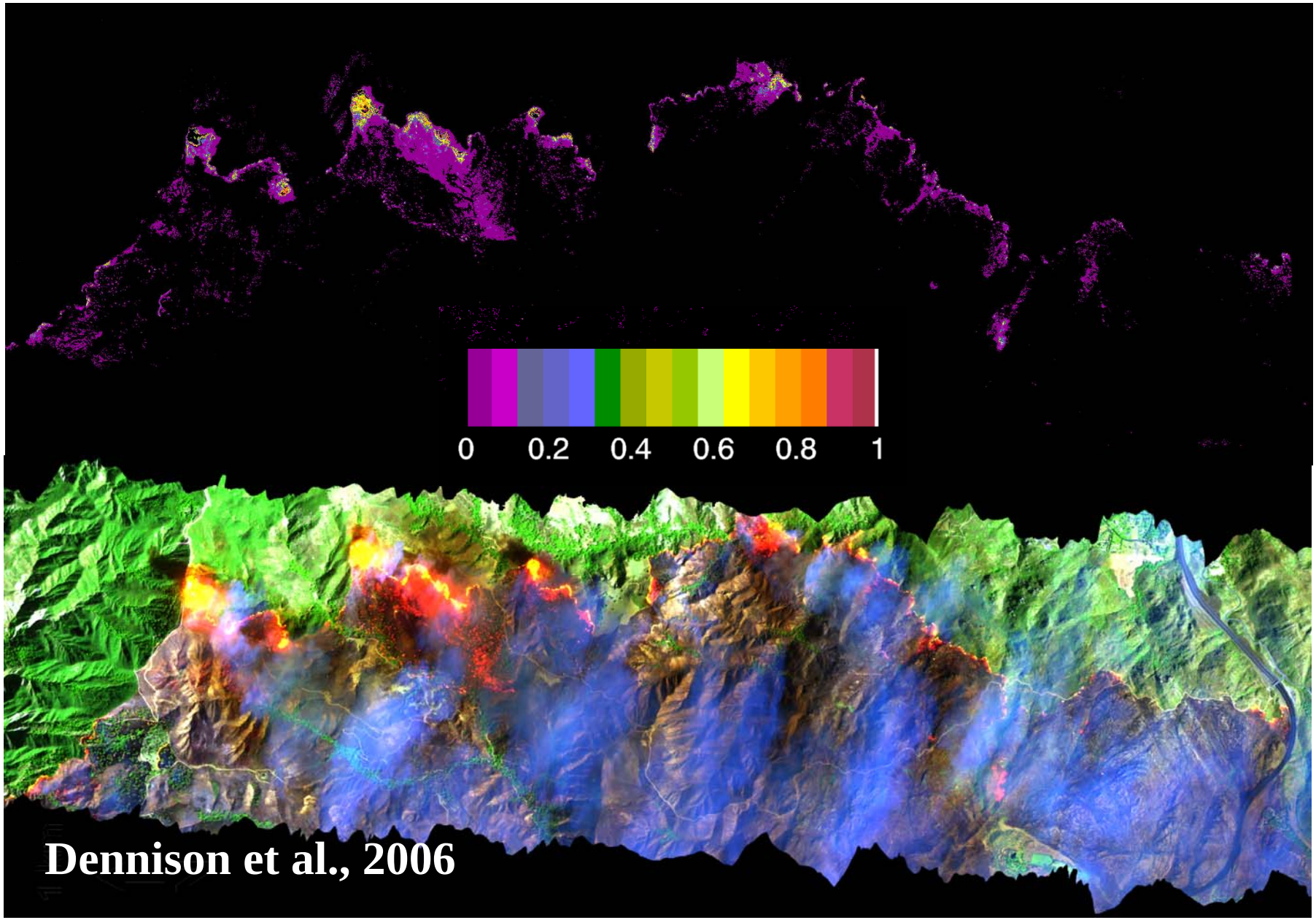
Canopy water content retrieval and invasive-species mapping using hyperspectral AVIRIS data.

Asner and Vitousek (2005)

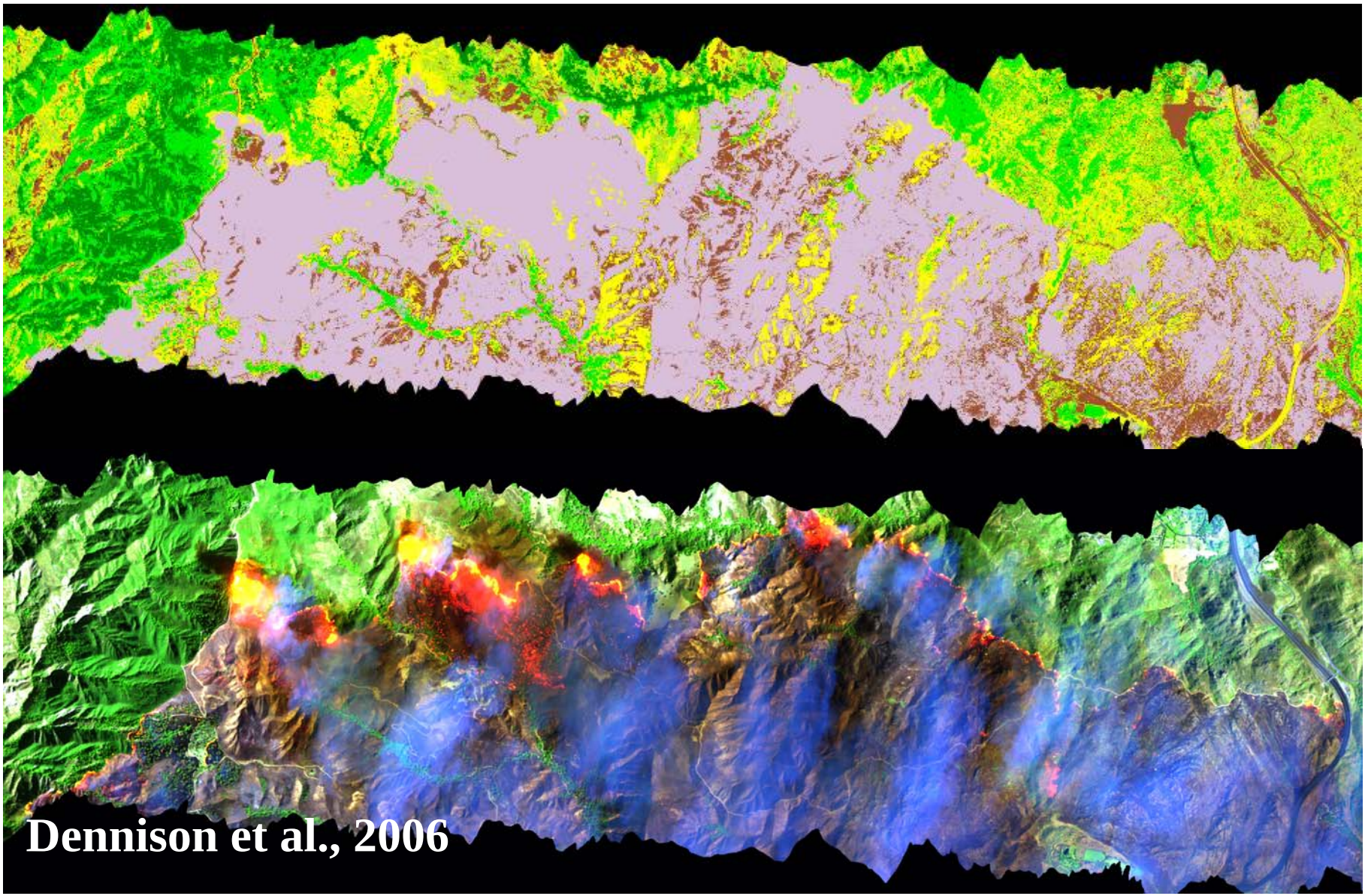
Retrieved Temperature Endmembers



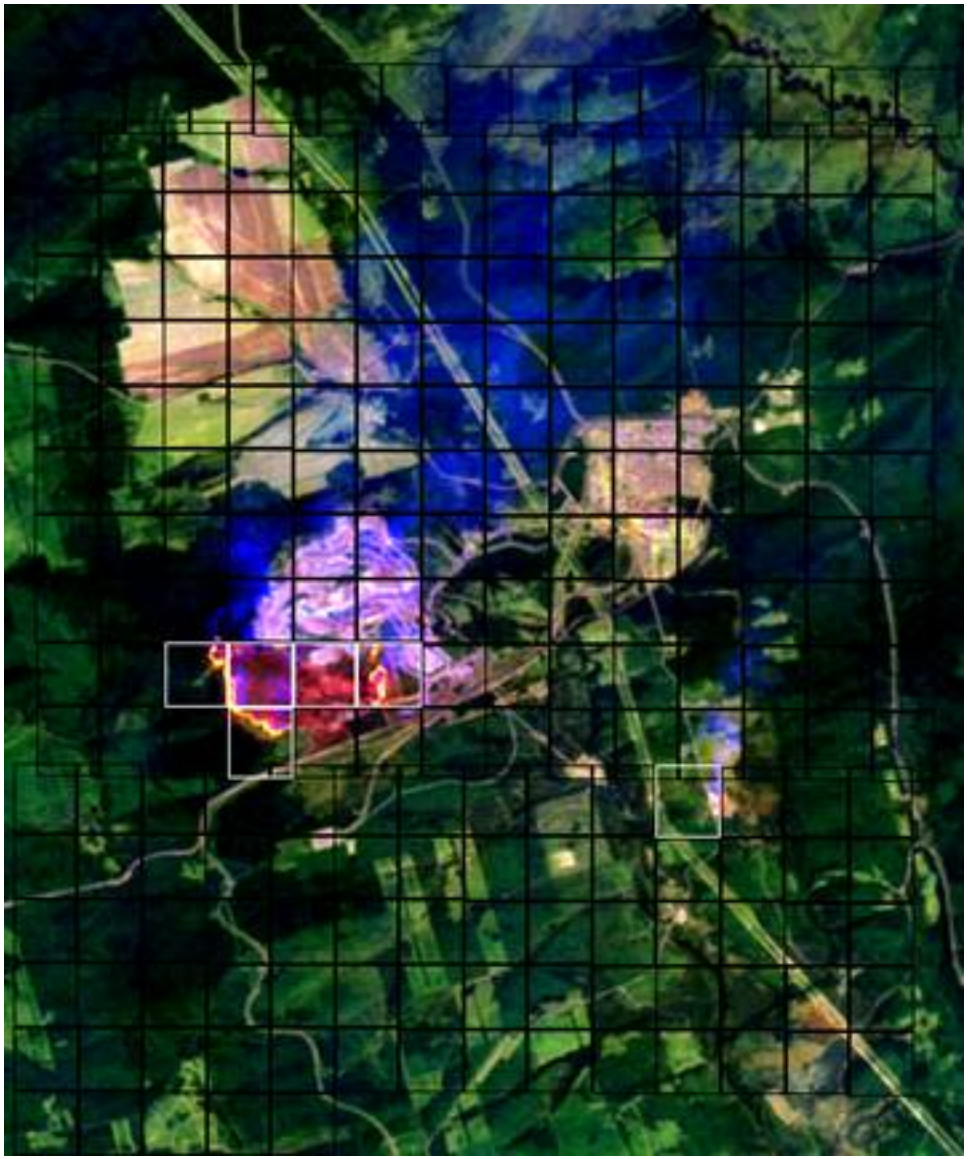
Sub-Pixel Fire Fraction



Land Cover


Ash
Riparian
Sparse Chap.
Soil
Dense Chap.
Grass
Dennison et al., 2006

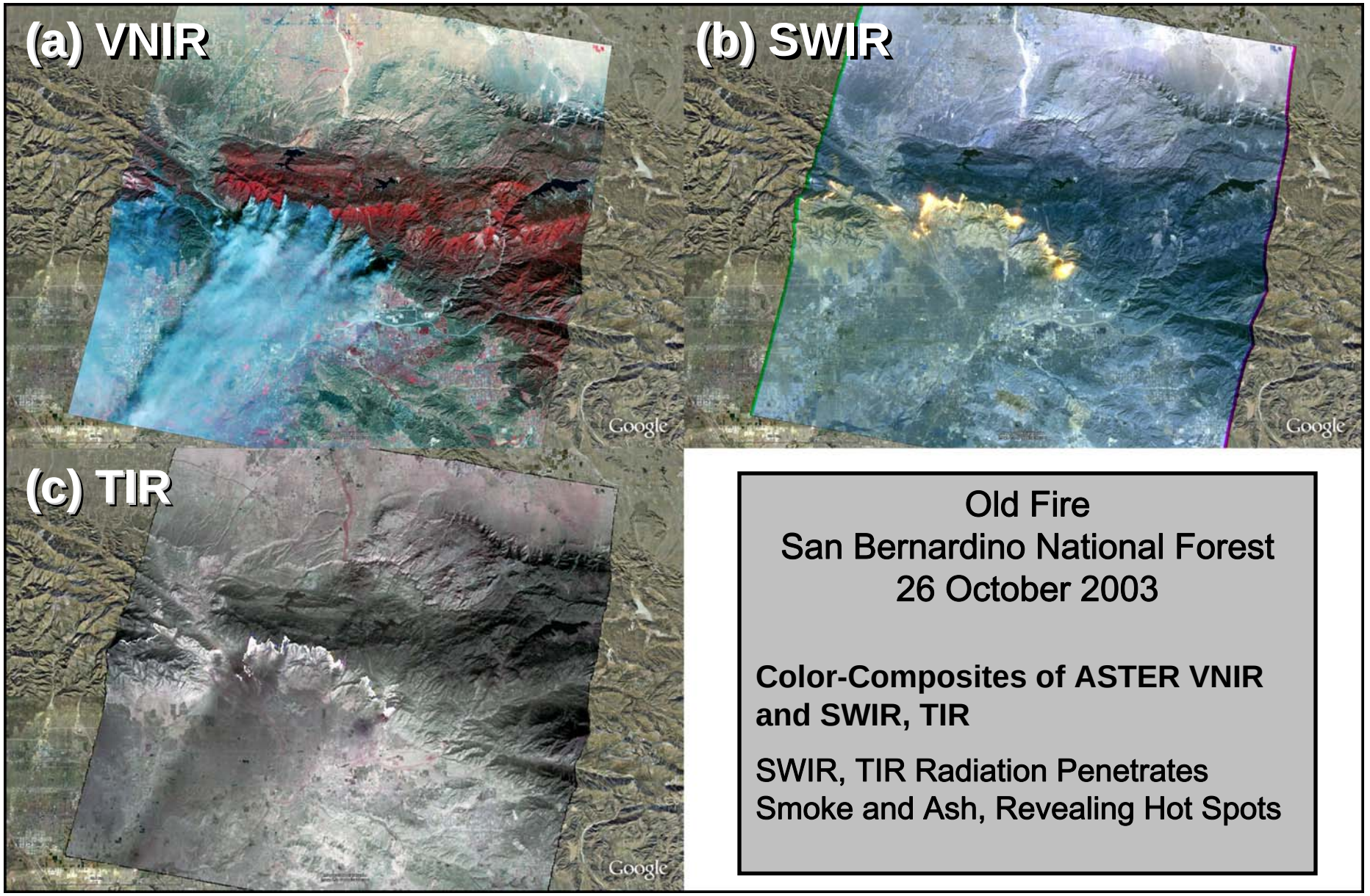
Fire Detection Using Thermal Bands



30 m ASTER scene with MODIS pixels superimposed (black and white squares)

Central Siberia

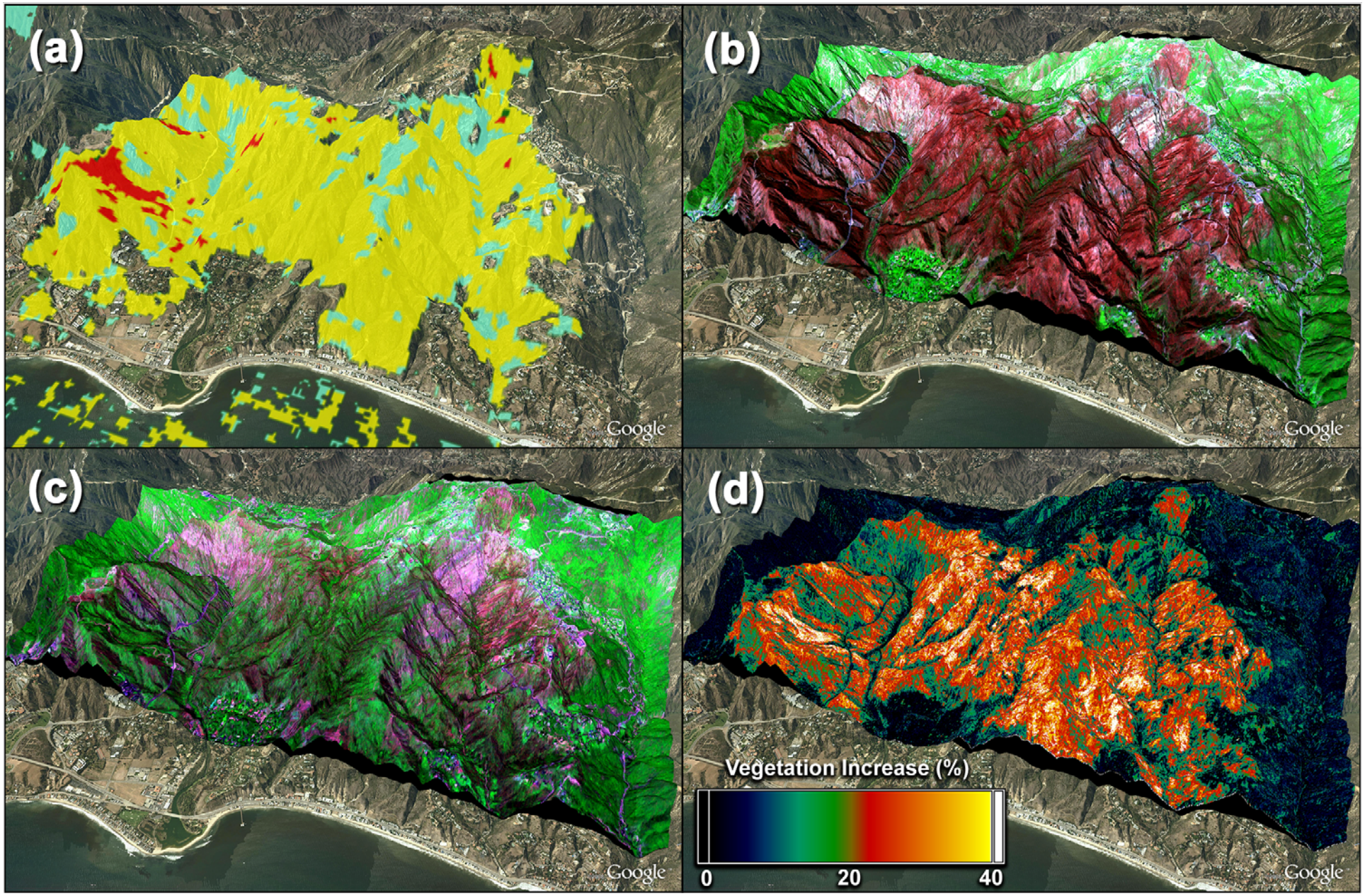
30 May 2001



Old Fire
San Bernardino National Forest
26 October 2003

Color-Composites of ASTER VNIR and SWIR, TIR

SWIR, TIR Radiation Penetrates Smoke and Ash, Revealing Hot Spots



Slide courtesy of V. Realmuto